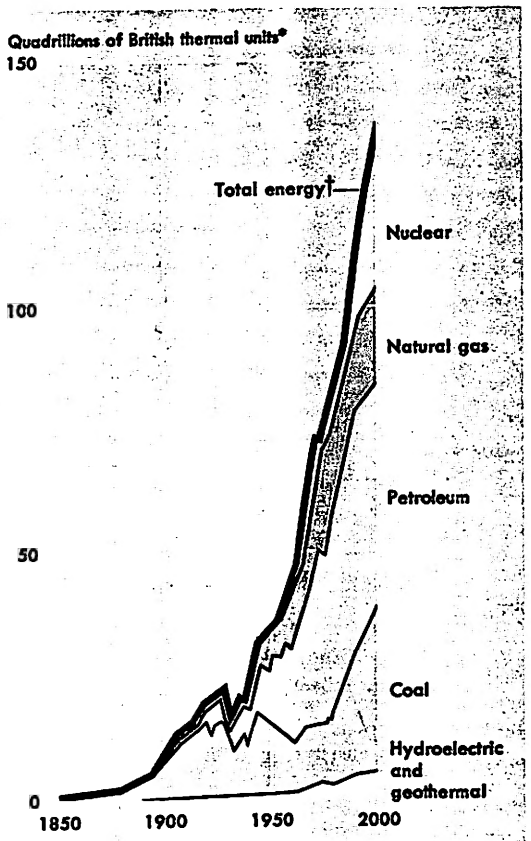
Sources of U.S. Energy

This graph shows how energy sources have changed since 1850. In the 1950's, petroleum replaced coal as the most important fuel. By the year 2000, nuclear energy may supply a fifth of U.S. power.



*One British thermal unit (BTU) equals 1,055 joules.
†Total for year 2000 includes 6.9 quadrillion BTU's from oil shale, solar energy, and biomass (burning or gasification of wood and wastes).

Sources: *Annual Report to Congress, 1977*, Energy Information Administration, U.S. Department of Energy, April 1978; *Historical Statistics of the United States, Colonial Times to 1970*, U.S. Bureau of the Census, September 1975; *Monthly Energy Review*, September 1978, U.S. Department of Energy.

Natural Gas accounts for about 20 per cent of the energy used in the world and about 25 per cent of that used in the United States. Millions of people use gas to heat their homes, cook their meals, and dry their laundry. Many industries use gas for heat and power.

Natural gas is the cleanest and most convenient fossil fuel. It can easily be transported through pipelines, and it causes almost no air pollution.

Bituminous Sands, also known as *oil sands* or *tar sands*, someday may become a major source of oil. But the process of removing the oil from these sands costs more than the normal production of petroleum.

Oil Shale is a type of rock that can be processed to yield petroleum. But oil obtained from shale costs more than that pumped from the earth. In addition, oil-shale mining tears up large areas of the countryside and produces huge piles of waste rock.

Wood once served as the chief fuel. It still furnishes a small percentage of the energy used in the world. But wood's importance as a source of energy will probably decrease in the future.

Water Power furnishes about 2 per cent of the world's energy. It provides 4 per cent of the energy used in the United States. Water costs nothing and cannot be used up, and it supplies energy without pollution. But most water power projects require a dam or other expensive structure. Also, a water power plant can operate only where water flows from a higher place to a lower one. Many suitable locations already have power plants.

Nuclear Energy provides about 1 per cent of the energy used in the world and about 4 per cent of the energy used in the United States. Nuclear energy comes from *fission*, the splitting of the atoms of certain elements, especially uranium. Fission *reactors* (devices in which controlled atomic reactions take place) power several ships and generate some electricity. By the year 2000, nuclear energy may furnish about 20 per cent of the power in the United States.

Eventually, physicists expect to control the power of *fusion*, the combining of atomic nuclei. Fusion produces the heat and light of the sun and stars—and the explosive force of the hydrogen bomb.

Nuclear Fission creates huge amounts of energy from small amounts of fuel. Nuclear plants also produce electricity without the air pollution caused by burning.

But fission has several disadvantages as a source of energy. Experts predict that the supply of high-quality uranium will last only until the end of the century. Also, fission plants produce more waste heat than do plants that burn ordinary fuel. Unless nuclear plants have expensive cooling devices, their waste heat creates *thermal* (heat) *pollution* that may damage the environment. They also produce tons of radioactive wastes yearly. In addition, nuclear power plants present the danger of accidental discharges of radioactivity.

A *breeder reactor* could provide immense quantities of energy, exceeding those from coal. This special type of reactor produces more fuel than it uses to produce energy. Such surplus fissionable material can be used by other nuclear reactors. A breeder reactor would generate less unused heat than an ordinary reactor. Scientists expect to develop efficient breeder reactors for wide-scale commercial use by the early 1990's.

Nuclear Fusion occurs only at very high temperatures. For this reason, such a reaction is also called a *thermonuclear reaction*. Some scientists believe controlled fusion will be achieved by the year 2000. This accomplishment might solve the world's energy problems for millions of years, if fusion proves to be economical.

A fusion reactor would use *deuterium*, a form of hydrogen, for fuel. The oceans contain enough deuterium to provide all the energy people may ever need. In addition, fusion would create little danger of explosion or radiation. The problem of waste disposal would not arise because most products of fusion are not radioactive.

Solar Energy is used throughout the world to perform various small jobs. For example, simple devices called *flat-plate collectors* heat buildings and water by absorbing the sun's heat. Devices called *solar cells* or *photovoltaic cells* convert light into electricity.